

The background of the slide is a photograph of a coastal landscape. In the foreground, there are green, grassy hills. In the middle ground, a steep, rocky cliff meets the ocean. A white bridge is visible in the distance, spanning a body of water. The sky is filled with large, white, fluffy clouds. The overall scene is a mix of natural beauty and human infrastructure.

Panel on Adaptation Planning in the West Coast

NOAA's Adaptation & Climate Services

**Dr. Chester Koblinsky, Director
NOAA Climate Program Office**

PIER 5th Annual California Climate Change Research Conference

U.S. Global Climate Change Impact Report

- Summarizes science of climate change and the impacts of climate change on the US
- Based on 21 CCSP Synthesis Assessment Products/IPCC reports/other assessments
- Provide credible scientific information to scientists and decision makers for **U.S. regions and sectors**
- Interagency accomplishments (13 agencies)

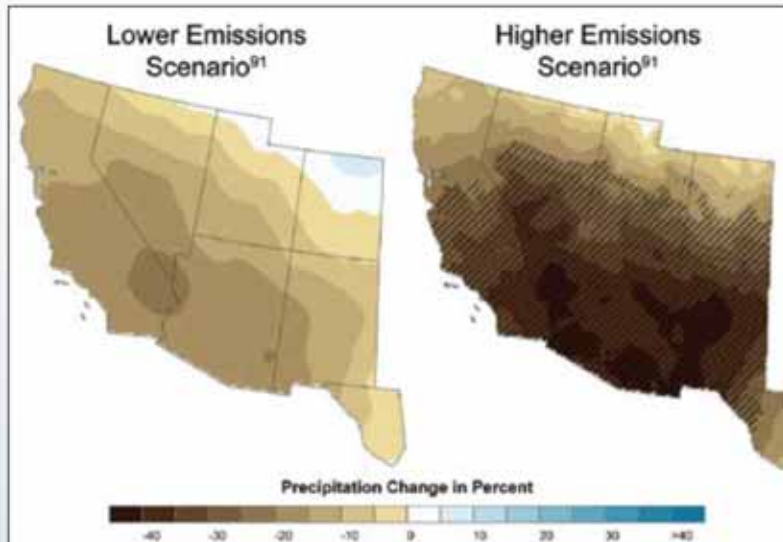


<http://www.climatescience.gov/Library/sap/usp/>

Recent Findings: Southwest U.S. Global Climate Change Impacts in the US



Source: <http://www.globalchange.gov/>



- Water supplies are projected to become increasingly scarce, calling for trade-offs among competing uses/leading to potential conflicts
- Increasing temperature, drought, wildfire, and invasive species will accelerate transformation of the landscape

- Increased frequency, and altered timing of flooding will increase risks to people, ecosystems and infrastructure
- Unique tourism and recreation opportunities are likely to suffer
- Cities and agriculture face increasing risks from a changing climate



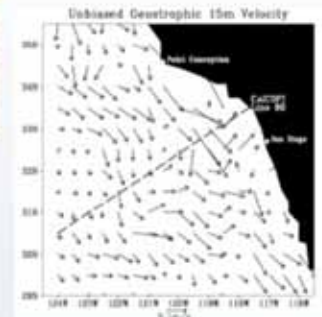
NOAA monitors climate variables in California that are critical for adaptation

● Observation Networks

- US Climate Reference Network (USCRN) Air temp., precipitation, solar radiation and wind speed (7 stations in CA)
- Tide gauges for long-term sea level measurements - Center for Operational Oceanographic Products & Services (CO-OPS)
- Argo and Global drifter program measures ocean currents, SST and atmospheric pressure for winds and salinity



USCRN



Geostrophic currents (JIMO)

● California Nexus (CalNex)

- Air quality measurements (aerosols, GHGs etc.) using NOAA observation infrastructure (Vessels, Aircrafts)
- Collaborate with Others on fielding Ground-based Remote and In Situ Instrumentation

NOAA
WP-3D



● California Current Ecosystem Data Management

- Demonstrate the linkage between ecosystem data and a preliminary Integrated Ecosystem Assessment (IEA) for the California Current Ecosystem
- The linkage between 5 core variables (i.e., Ocean color, currents, sea level, salinity, temperature) for preliminary IEA



NOAA R/V Ronald H. Brown

Enhanced Climate Modeling at Regional Scales

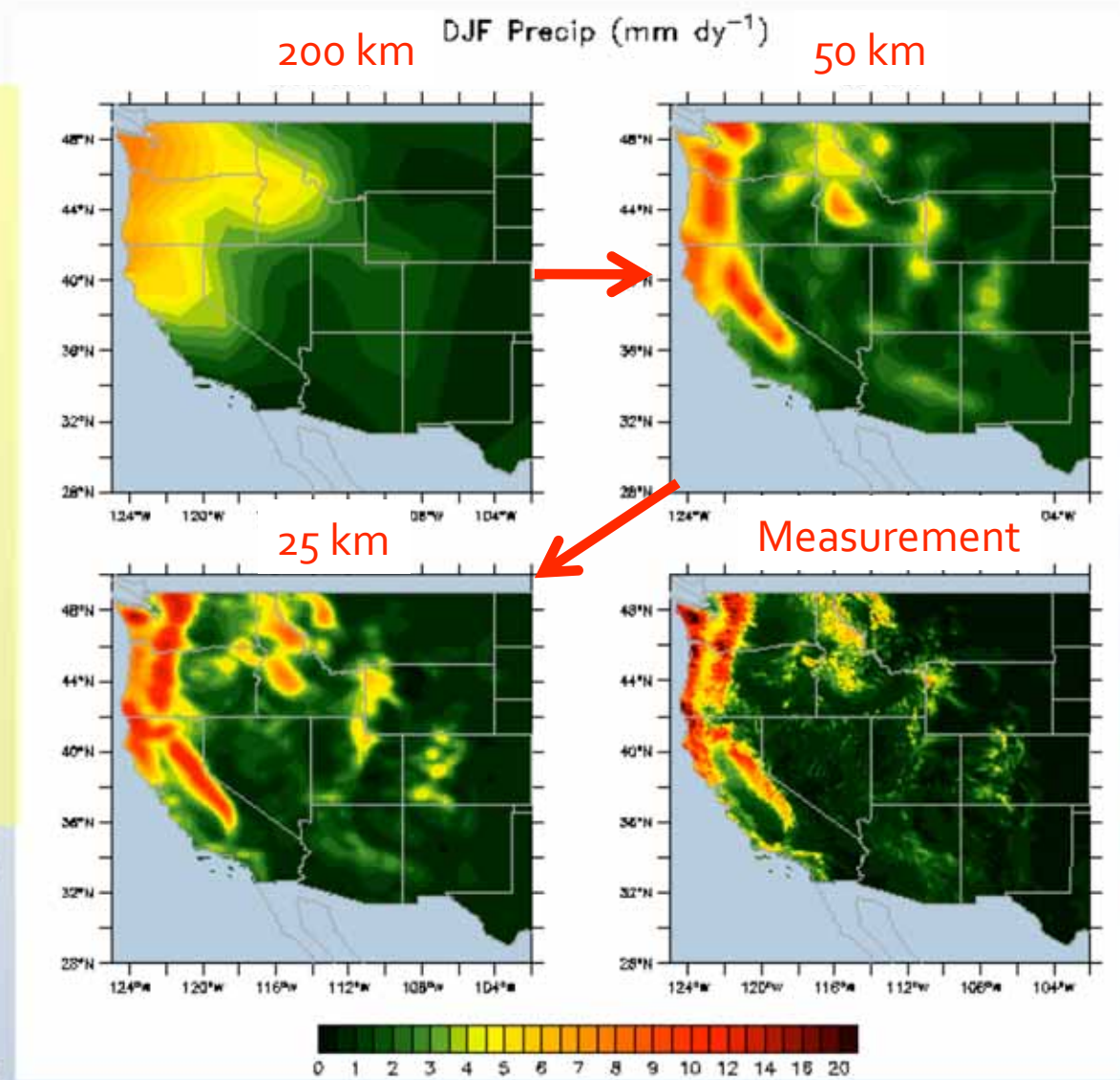
An Example: Precipitation in Western US

NOAA's high resolution models (*currently under development*) will dramatically improve the resolution of model outputs that is necessary to accurately predict regional climate change/variability

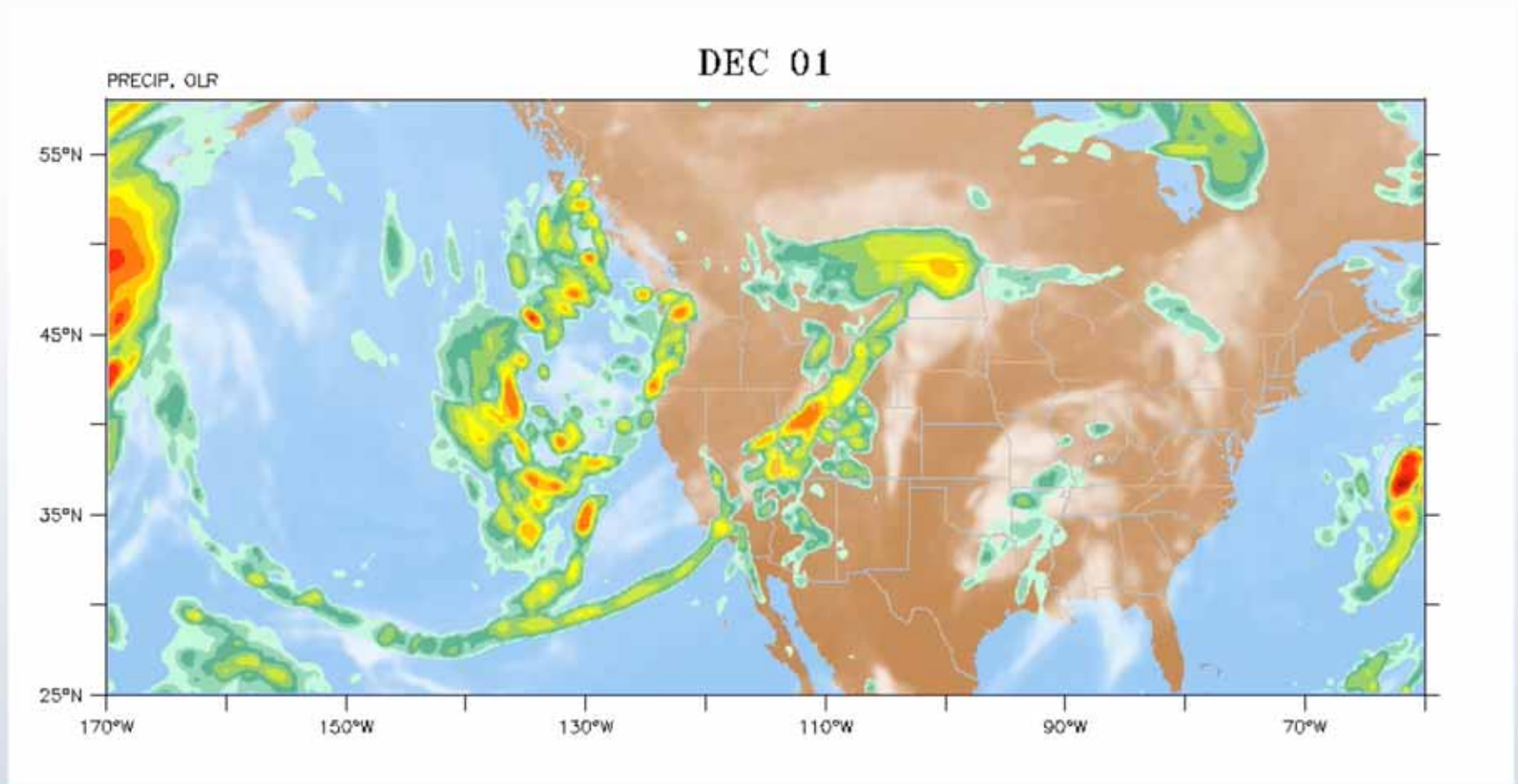
The outcome will lead to significant improvement on decision-making for various **regional** climate issues (e.g. water)

*Winter mean precipitation in
Western U.S
25 yr simulations.*

Source: Isaac Held, GFDL



Enhanced Climate Modeling



Credit: Isaac Held and Bruce Wyman (NOAA/GFDL)

Precipitation for 25 km global model
(Dec 1, 2000-Feb 28, 2001)

Color scale (Non-linear)

The dull yellow shading: 10-20mm/d

Bright yellow: 20-30mm/d

Orange: 30-50mm/d.

The darkest red: >300 mm/d

Climate services: drought and water resources

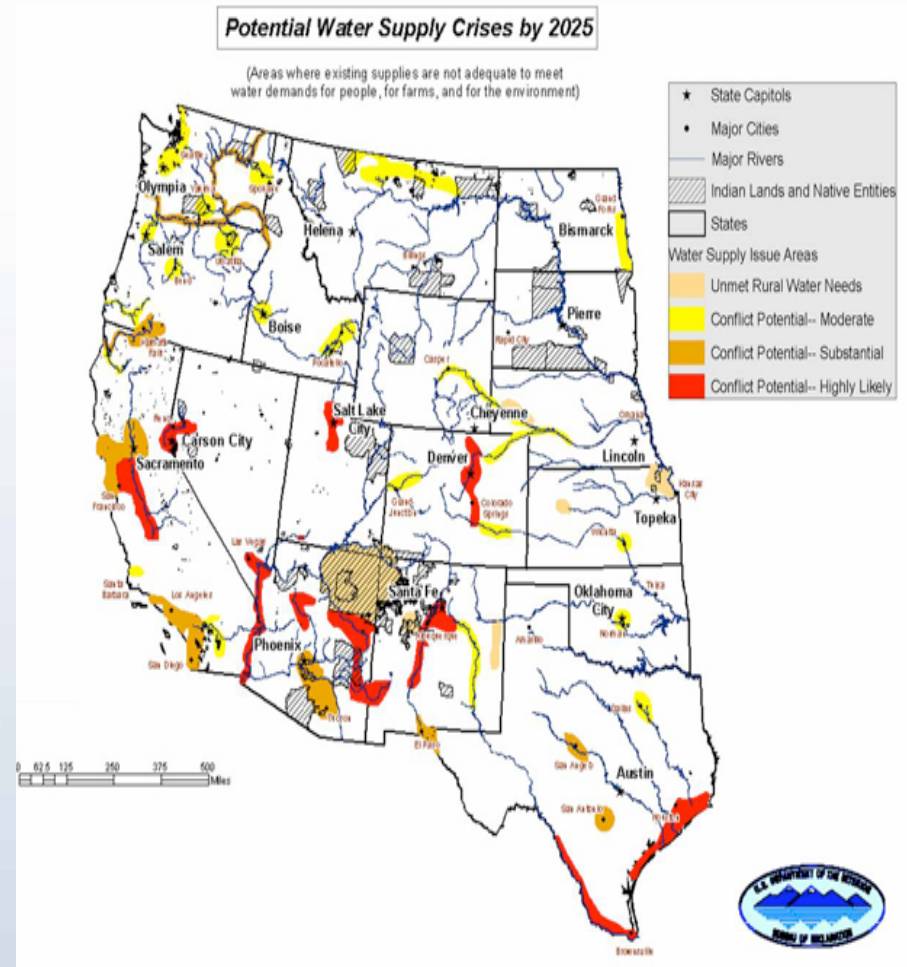
How are communities, economies, and environment affected?

Water supply, quality, and demand...

- Affects energy, agriculture, health, urbanization, ecosystem services
- Climate impacts on water resources and management practices, shared watersheds...

Living Marine Resources

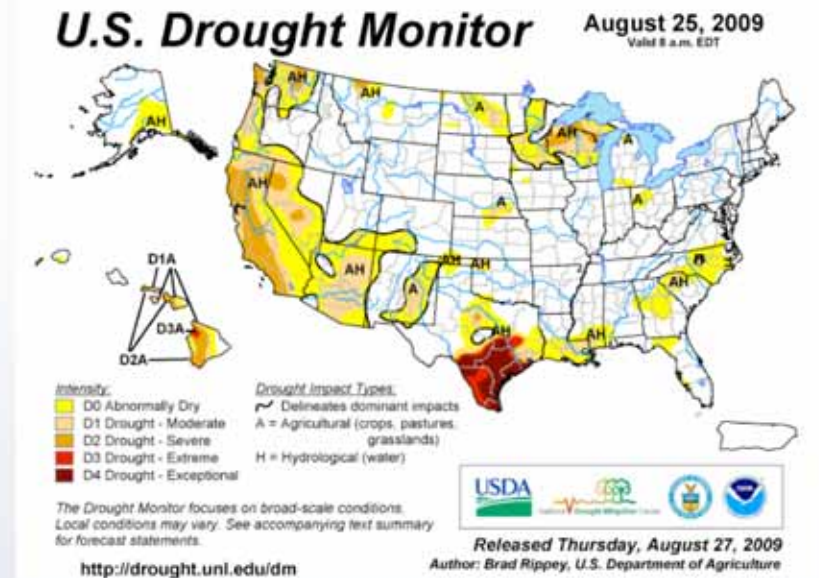
- Fisheries (e.g. Salmon) will be affected by drought, other environmental stress and human-induced impacts



Climate services: drought and water resources

What role does NOAA play in improving society's capacity to respond and adapt to drought?

- Provides a number of services to help predict, response to and mitigate the effects of drought (e.g. NIDIS drought monitoring, seasonal outlooks)
- Development and implementation of drought early warning information system
- Assessing attribution
- Work between NOAA Climate Services and the state of California to develop training on how to incorporate climate information into their planning



Important Regional Partnerships

NOAA

- NWS Focal Points (6)
- National Marine Sanctuaries (14)
- Coastal Services Centers (7)
- Regional Teams (8)

Partners

- Regional Integrated Sciences and Assessments (9)
- Regional Climate Centers (6)
- Sea Grant (32)
- State Climatologists (47)
- National Estuarine Research Reserves (30)



Our nation needs a climate service....



...that will serve and provide authoritative climate information and services to assist the nation's citizens in making climate-related decisions that enhance their lives and livelihoods.

"The climate challenge before us is real. The nation needs targeted climate services at scales from local to global to help people understand, adapt to, and mitigate climate change ."

Jane Lubchenco, Ph.D.

Under Secretary of Commerce for Oceans and Atmosphere
Administrator, National Oceanic and Atmospheric Administration (NOAA)

A scenic landscape photograph of a coastline. In the foreground, a steep, grassy cliffside slopes down towards the ocean. The ocean is a deep blue with white-capped waves crashing against the base of the cliff and several large rock formations. In the middle ground, a long, white bridge spans a narrow strait between two landmasses. The background features rolling hills and mountains under a sky filled with large, white, fluffy clouds. The overall tone is bright and natural.

Thank you

PIER 5th Annual California Climate Change Research Conference

Backup Slides

A Step in this Direction Is the Aspen Workshop in Late September:

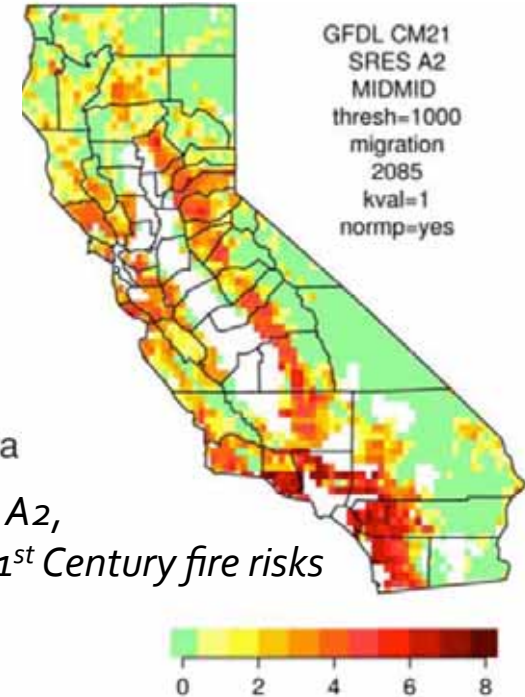
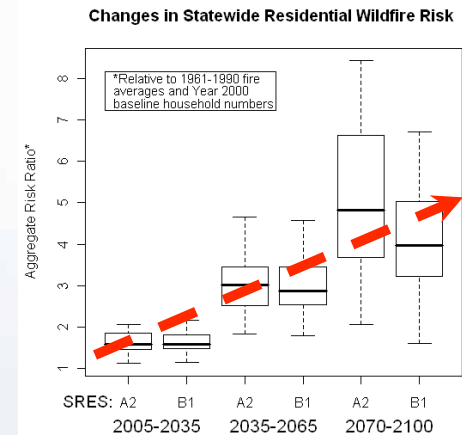
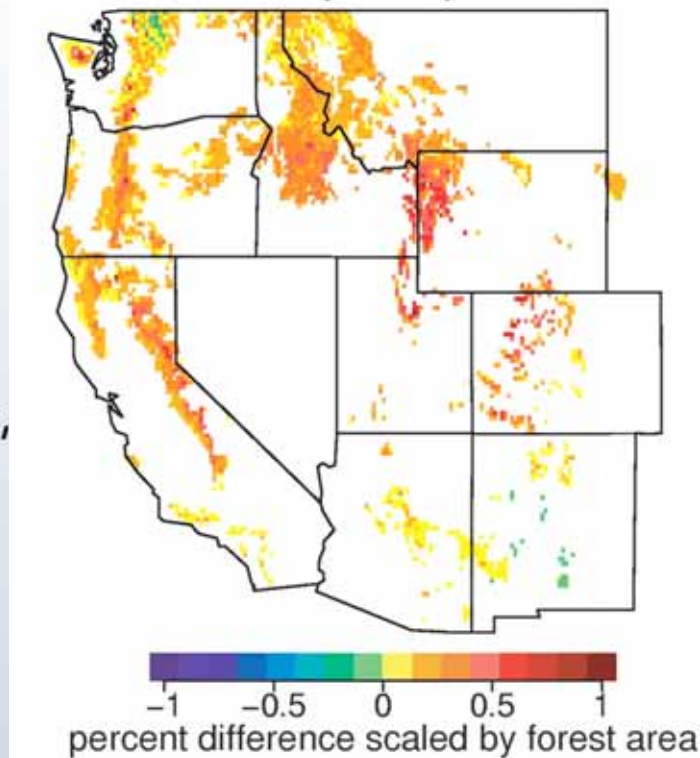
- **Intended to focus on productive relationships between advanced climate modeling and support for water system management planning and decisions related to climate change**
- **Supported by NOAA and USGS**
- **Co-organized by Roger Pulwarty/NOAA and Tom Wilbanks/ORNL**
- **Bringing water management decision-makers together with leading climate modelers:**
 - To clarify climate change information needs of decision-makers
 - To determine how these needs match what current climate science and models can do, could do now, or could do with additional research and model development
 - To identify gaps and how to close them: e.g., through interface assists or alternative strategies

California RISA Activities

Seasonal forecasts for western wildfire risks

We face significant increases in summer wildfires with global warming

- CAP (RISA) and CCCC (State-funded adjunct) are helping California to address its climate-related issues and needs
- Develop local models and forecasts of water resources, fire risks & public health
- Water resources, wildfire risks, electrical supply & demand, and public health issues are major focuses



*GFDL A2,
mid 21st Century fire risks*

Source: Tony Westerling, UC Merced
Credit: Dan Cayan & Mike Dettinger, CAP

Toward World Climate Services

A “global framework for climate services” (GFCS) is the outcome of the World Climate Conference-3 (WCC-3) held in Geneva, Switzerland, this September

WCC-3 - HIGH-LEVEL DECLARATION

OP 1: Decide to establish a Global Framework for Climate Services ... to strengthen production, availability, delivery and application of science-based climate prediction and services;

“To work, solutions must fit local circumstances and produce results that people can use. Climate services must be relevant, accessible, timely, open, reliable, and sustainable.”

Dr. Jane Lubchenco, Under Secretary of Commerce for Oceans and Atmosphere, NOAA



NCS: Congressional Interests:

- American Clean Energy and Security Act (HR2454)
 - OSTP-led process: Establish a National Climate Service within 3 years
 - NOAA: Establish Climate Service Office
 - NOAA: Network of regional and local partnerships

California Climate Adaptation Strategy

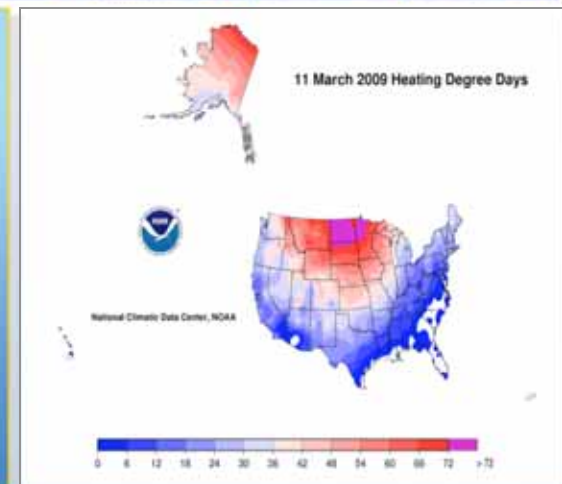
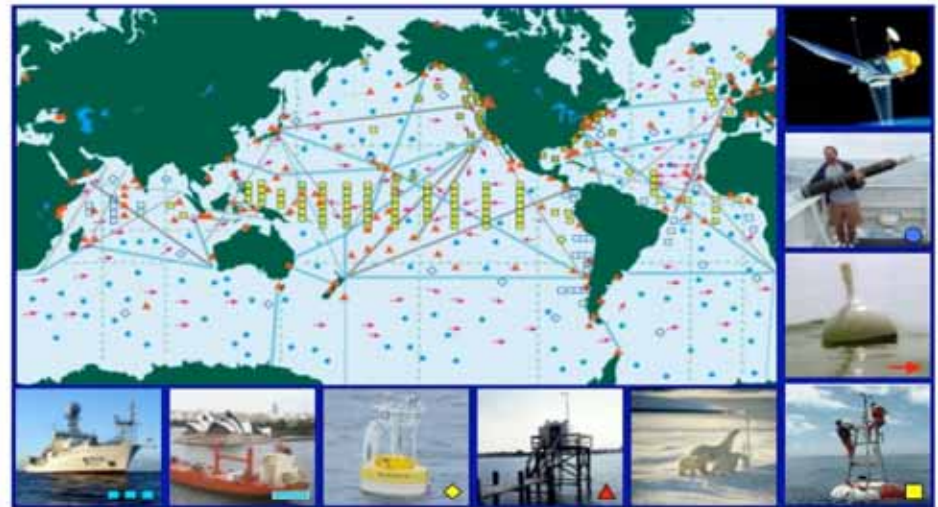
Selected key draft recommendations:

- California must change its water management and uses because climate change will likely create greater competition for limited water supplies
- All significant state projects, including infrastructure projects, must consider climate change impacts
- The State should identify key California land and aquatic habitats from existing research that could change significantly this century due to climate change

Monitor the State of the Climate

Climate Observations Program:

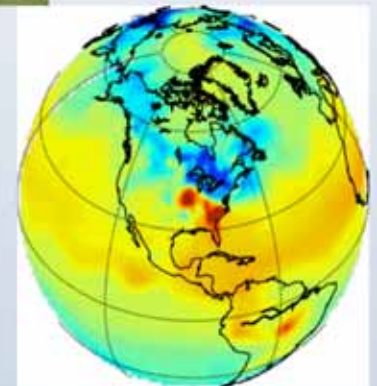
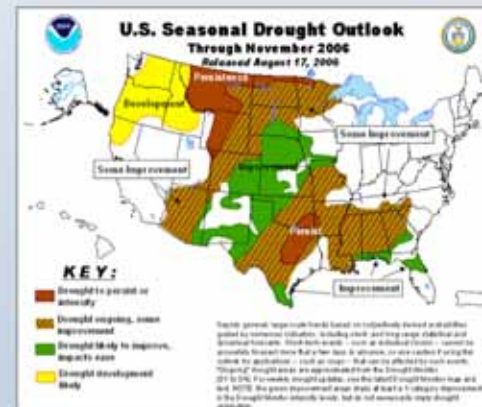
- Climate system observations
 - Ocean
 - Atmosphere
 - Arctic
 - Carbon
- Data management and information
 - NOAA's Comprehensive Large Array-data Stewardship System
 - State of the Climate Report
 - Climatological statistics and summaries



Understand the Future State of the Climate

Climate Research and Modeling Program:

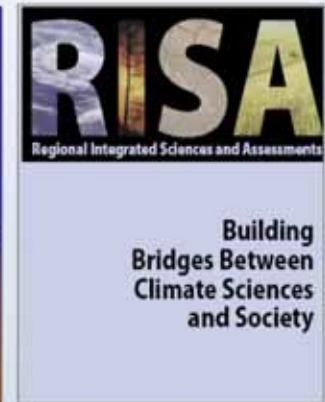
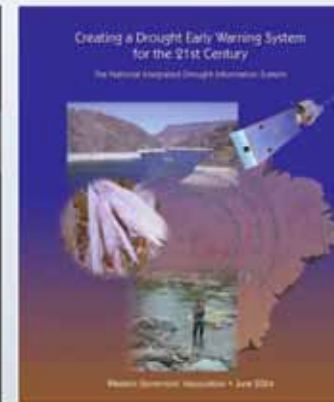
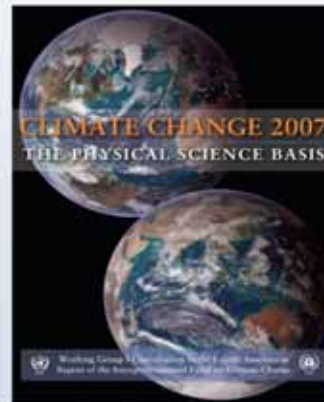
- Understanding climate processes
 - NOAA's research laboratories, centers, and cooperative institutes
 - Competitive grants
 - Climate dynamics, atmospheric composition, carbon cycle
- Earth system modeling, predictions, and projections
 - GFDL and NCEP
 - Coupled climate models
 - Earth system model development
- Analysis and attribution
 - Reanalysis
 - Integrated Earth system analysis
 - Attribution



Assess Evolving User Needs and Context

Climate Services Development Program:

- Assessing Climate, Impacts and Adaptation
 - Global, national, regional, and sectoral assessments of vulnerability, impacts and adaptation
- Climate Services Development and Delivery
 - National Integrated Drought Information System (NIDIS)
 - Emerging foci on coasts, Arctic, and regional and international fisheries



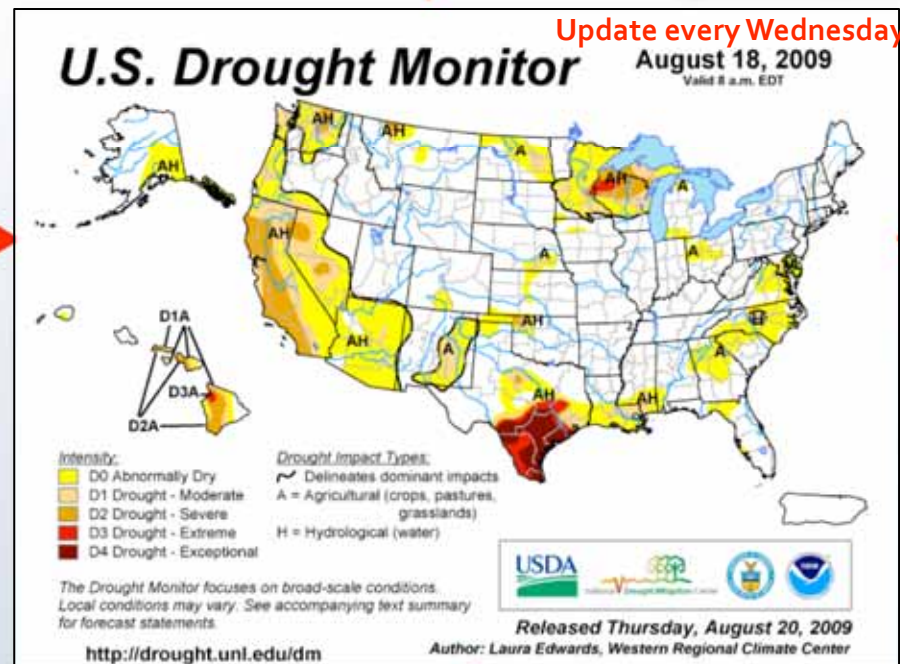
NIDIS: U.S. Drought Monitor

How can NOAA Climate Services help inform decisions?

Various NOAA Climate data
as input for drought monitoring

Interagency
Partners:

NWS/CPC
USDA/JAWF
NDMC
NCDC



Other Experts:

USGS
State Climos
RCCs
NWS Hydros

Media

Post Thursday AM

Emergency
managers

Federal, state and
local government

Public

How can NOAA Climate Services work for you?

An example: California wildfires

- Fire dynamics/initiation are influenced by wind/humidity
- The antecedent conditions of wildfires are controlled by fuel amount/energy content on a seasonal and longer climate conditions (e.g. precipitation deficit/temperature trends)
- Forest fire risk goes up during drought
- Wildfire costs are expected to increase



Selected Societal Benefits from NOAA

- NOAA’s climate/weather data help forecast wildfires and facilitate prompt actions to avoid catastrophes
- Drought outlooks can help identify where we should have higher risks for future infrastructure
- Provide trainings to users on how to use NOAA climate/weather information for mitigation/adaptation etc.